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DISTRIBUTION OF SOMATOSTATIN-LIKE REACTIVITIES IN CHICKEN HYPOTHALAMUS
鸡下丘脑内生长抑素样成分的分布。

Key words Somatostatin, Immunocytochemistry, Hypothalamus, Chicken
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SS (somatostatin) is widely distributed in the bodies of different animals from the low invertabrates (such as protozoa) to vertabrates. The distribution of SS in the brain varies in species. In mammalian brain, except cortex, hypothalamus contains the highest SS level (Zhou, 1989). Evidences for SS innervation in the mammalian and human hypothalamus have been obtained by a number of investigators. However, the reports are very few in birds. The present paper disclosed the distribution of SS-like immunoreactivity in the chicken hypothalamus by using immunocytochemical (ABC) technique to provide phylogenetical evidence for a better understanding of SS function.

1 Materials and Methods

12 adult female chicken (White Leghorn), weighting 1.2 － 1.3 kg, were anesthetized with an intraperitional injection of sodium pentobarbital (75 mg/kg body wt.) and perfused through the ascending aorta with 100 mL saline followed by 400 mL ice-cold Zamboni's fluid. The brains were rapidly removed and immersed in the same fixative for 4 － 6 hours at 4℃ and then rinsed for at least 12 hours in 0.1 mol/L phosphate buffer containing 30% sucrose. Frontal sections were cut on a cryostat with section thickness of 40 μm and incubated in phosphate-buffered soline (PBS). The sections were processed for immunocytochemistry using ABC technique. Briefly, sections were eqentially exposed to: (1) 10% normal sheep serum; (2) rabbit antiserum to SS (INC, British), 1∶400, 37℃, 1 hr; (3) biotin-labeled sheep anti-rabbit immunoglobulin G, 1∶200, 37℃, 1 hr; (4) ABC (Vector, U.S.A.), 37℃, 1.5 hr; With PBS washes between each step. Sections were developed in 0.05% DAB + 0.03% H_2O_2 Tris/PBS.

Adjacent sections were stained with cresylviolet for identification of nuclear groups.

Controls: (1) antiserum to SS was replaced by PBS; (2) antiserum to SS was replaced by normal rabbit serum. Both of their results were negative.

2 Results

2.1 Nucleus lateralis hypothalamus (LH) SS-positive cells were found in 1/3 of the rostral LH. They occupied an area at some distance of 0.96 mm in the rostral and caudal direction, with the highest concentration in the rostral part. At this level up to 48 profiles could be seen on each side of the LH in a single section. Caudally the SS-positive cells were seen in the LH at the medial level of the paraventricular nucleus (6 － 15 μm in diameter) and round, ovoid and fusiform in shape. LH also contained a medium dense of SS-labeled fibers at the rostral and caudal part, only scattered SS-labeled fibers were found in the rest of the LH.

2.2 Nucleus medialis hypothalami posterior (PMH) and nucleus hypothalami posterior (PH) A moderate number of SS-positive cells were observed in the entire rostrocaudal extent of PMH and the rostral part of PH. This group of cells was composed of medium-sized (16 － 22 μm in diameter), round or elongaled neurons, occupied an area at some 1.32 mm from the rostral part of PMH to the rostral part of PH (the medial level of nucleus rotundatus).

The cell bodies and processes had a very strong immunoreactivity. A high concentration of SS-labeled fibers was seen in the PMH. They were confined to its ventral part. There was no SS-labeled fibers in the PH.

2.3 Median eminence (ME) There were no SS-labeled neurons in the ME, but the heaviest concentration of SS-labeled fibers and nerve ends were seen. Most of them were restricted to its external layer. They were very densely packed, dust-like or dot-like, and had a very strong immunoreactivity.

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They often surrounded blood vessels. The internal layer of the ME contained a low density of SS-labeled fibers.

2.4 Area above the decussatio superaoptica dorsalis (DSV)

A very high density of SS-positive fibers was seen in the area above the decussatio supraoptica dorsalis. These fibers spreaded caudally to invade the ME.

2.5 Corpus mammillare (CM) A moderate number of SS-containing fibers and nerve ends was seen in the CM.

3 Discussion

3.1 Comparison with other studies in birds The present study showed that the localization of SS-positive structures in the hypothalamus of chicken appears to be fundamentally similar to that of parakeet. Both chicken and parakeet contained SS-like neurons in the rostral part of the LH, PMH and the rostral part of the PH (chicken) or caudal part of the PH (parakeet); SS-like fibers were localized in the regions in which SS-like cells were noticed. Besides, the external layer of ME and the area above the DSV contained the heaviest concentration of fibers.

The points of difference are as follows: (1) The PMH contained medium numbers of SS-positive cells in chicken, however, scattered SS-positive cells in parakeet; (2) A large group of SS-positive cells were observed in the PH of parakeet, particularly in its caudal part; However, in the PH of chicken, there was a very small group of SS-positive cells, and they continued with the SS-positive cells of PMH; (3) There was a medium concentration of SS-like fibers in the CM of chicken, while, no SS-like fibers was identified in this area of the parakeet; (4) Taktsuki reported in this abstract that there was a large group of SS-positive neurons in the mammillary nucleus of parakeet, but he didn't mention it in the results and discussion, while there were no SS-positive cells in these nucleus of chicken.

According to Blahser's report about the distribution of SS-like immunoreactivity in the hypothalamus of the domestic mallard, the main difference was that there was no SS-positive cells in PMH of the domestic mallard.

3.2 Comparison with the studies in mammalian The mammalian hypothalamus such as human (Bouras *et al.*, 1986), rat (Dierickx *et al.*, 1979), dog (Hoffman *et al.*, 1979), bat (Cotter *et al.*, 1987), sheep and pigdog (Papadopaulos *et al.*, 1986) contained SS-like neurons mainly in periventricular, vertromedial, lateral, arcuate, suprachiasmatic, posterior and dorsomedial nuclei, sometimes in supraoptic nucleus and preoptic area (Hitoshi *et al.*, 1988). SS-like fibers appeared in the region where SS-like cells were noticed. The highest density of SS-like fibers and ends concentrated in the external layer of the median eminence. While, SS-like neurons were localized in LH, PMH and PM of chicken and other birds; SS-like fibers were seen to densely allumalate in the area above the PVC and the external layer of the ME. These facts showed that the regions where SS-like structure were distributed in the hypothalamus of birds and mammals. The difference is that the distribution of SS-like structures in the hypothalamus of birds is far less than that of mammals. This kind of exceptions may concern with the difference between the structure of avian and mammalian brains. The existing data about the division of avian hypothalamus and the nuclei-named method are different from each other, and also different from the mammallian hypothalamus anatomy. The present study in view of Jungherr's anatomy of avian hypothalamus, though very detail and close to mammals', is some-what difficult to compare with each other.

3.3 Synthesis, release and pathways SS was synthesized in cell bodies in hypothalamus and then was transported to terminals by axoplasm. In normal conditions, SS release is calcium dependent and the main calcium channel involved in SS release corresponds to the voltage-sensitive calcium channel.

The roles of SS occur when it binds with its receptors. SS receptors in hypothalamus have relations with endogenous SS; this may show that there was endogenous SS circles in hypothalamus. The ratio between receptor and endogenous SS is lower than other regions of brain. One of the explanations may be that each nerve ending in hypothalamus contains much higher amounts of SS than the boutons in other region of brain. There is no SS receptor in ME (Hitoshi, 1988), SS directly entered into the hypophysial portal blood.

SS pathways in avian hypothalamus were not traced in this paper. Jiang and Hitoshi's studies support the view that median eminence SS originates in the anterior periventricular and rostral hypothalamic area. There were no projections from the caudal hypothalamus to ME. The present study demonstrates that there are a large group of SS-like bodies in the rostral hypothalamus.

This fact shows that the ME SS of birds may largely originated in the rostral LH, at least part of SS fibers of the area above DVA are passing fibers to ME. SS-like fibers in the other hypothalamus regions may be the fibers to connect hypothalamus with other brain regions and spiral.

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产品信息

蚂 蚁 食 品 简 介

蚂蚁在动物界中属于节肢动物门（Arthropod），昆虫纲（Insecta），膜翅目（hymenoptera），蚁科（Formicidae）。我国民间常作食疗用的蚂蚁主要是蚁亚科（Formicinae）多刺蚁属（*Polyrhachis*）中的拟黑多刺蚁或称鼎突多刺蚁（*Polyrhachis vicina* Roger）。这类蚂蚁分布于华南、西南及长江中下游地区，并以热带、亚热带地区的密度最高。它们是一类群居、树上筑巢、多品级的社会性昆虫。

我国药用和食用蚂蚁的年代十分悠久。东汉时就流传用蚂蚁磨粉炼蜜为“金刚丸”，治疗筋骨软弱症；唐代陈藏器著《本草拾遗》记载有蚂蚁的医疗效用；明朝大医学家李时珍在巨著《本草纲目》中详尽地记载了蚂蚁的药用和食用价值：玄驹有扶正祛邪、延年益寿、补肾强身、活血化瘀等功效；其后清代的赵学敏著《本草纲目拾遗》也有类似记载。经用现代科学仪器测定表明，拟黑多刺蚁体含49.4%～51.8%蛋白质，20余种游离氨基酸（包括8种人体必需氨基酸），Fe、Zn、Ca等近30种微量元素，7种维生素、蚁体液中草体蚁醛含量十分丰富、还富含高能磷化物ATP和各种酶类。就人类所需各类物质而言，蚁体所含的同类物质明显高于人们常用的数十种粮、油、肉食品中的含量。故蚂蚁被誉为“动物性营养宝库”。

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粉剂系列：以拟黑多刺蚁、冬虫夏草菌丝体为主，配以三七、人参、红花、黄芪等，磨研成细粉，制成“纯蚁粉”、“精配药蚁粉”和“精配药蚁粉胶囊”。

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